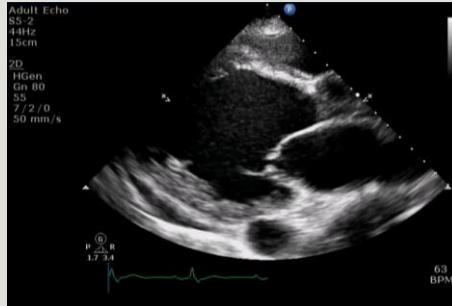


26 January 2017

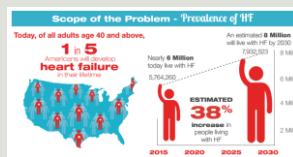
# Acute Heart Failure for MS 4



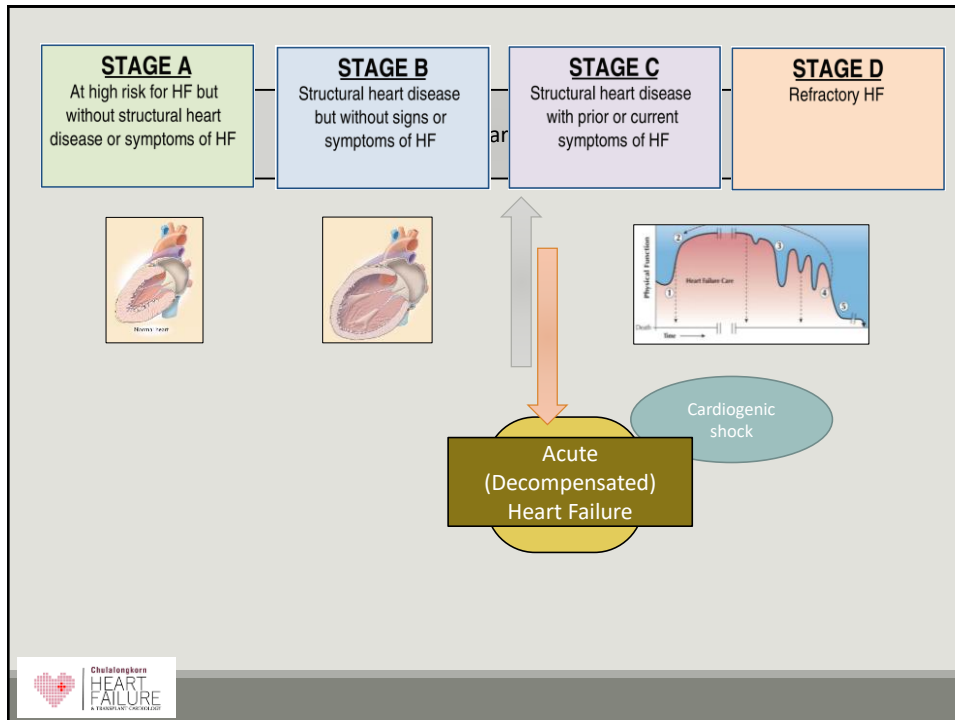
เอกราช อริยะชัยพาณิชย์

HEART FAILURE AND  
TRANSPLANT CARDIOLOGY

aekarach.a@chula.ac.th



AHA call for action Sept 2015



## Acute Heart Failure

- Change in signs and symptoms of HF resulting in a need for urgent therapy
- Most common cause of hospitalization in pts > 65 yo  
Circulation. 2013;127:e6–245
- High mortality
  - 4% in-hospital mortality
  - 50% re-hospitalization at 6 months.

ADHERE. Am Heart J. 2010;160:885–92

## Confused terminology

- Acute HF
  - Worsening HF (may be known or unknown chronic HF)
  - Usually rapid
- Acute decompensated HF
  - Worsening HF (of known chronic HF)
- De novo acute HF
  - The first episode of acute HF of that patient
- ~~Congestive HF~~

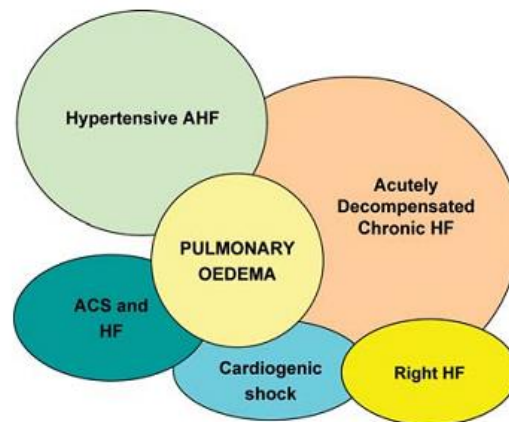


## Pathophysiology of acute HF

- Sudden worsening of hemodynamics
  - △ preload
  - △ contractility
  - △ afterload
- Typical symptoms
  - Congestion or hypoperfusion
- Vicious cycle of end organ damage, inflammation



Not all acute HF has pulmonary edema  
 Not all acute pulmonary edema are acute HF



## Classification of HF : more useful in chronic HF

Acute Chronic	rEF, pEF (improved EF)	Stage A, B, C, D	Warm-Wet-Cold Dry
NYHA fn class I, II, III, IV	Ischemic Non-ischemic	Left Ventricle Right Ventricle	Dilated Hypertrophic Restrictive
Endo / myo / epi	Backward / Forward failure	Low / High output	Systolic / diastolic failure



# Symptoms



# Dyspnea

- NYHA class
- PND (paroxysmal nocturnal dyspnea)
- Orthopnea
- รู้สึกแข็งแรงครั้งสุดท้ายเมื่อไร
- เมื่อ .... เดือน (ปี)ที่แล้ว มีอะไรที่เคยทำได้ แต่ตอนนี้ทำไม่ได้
- เล่าให้ฟังหน่อยชอบทำอะไร แล้วทำครั้งสุดท้ายเมื่อไร
- ถามคนที่อยู่ด้วย



# Why the patient has dyspnea

- **Real feeling of dyspnea** but less to do with intrinsic respiratory function or pulmonary edema
  - Mismatch between the efferent of the respiratory center in the brain and the afferent
- Afferent signals from
  - Mechanical receptors in the airways, lungs, chest wall
  - Chemoreceptors in the blood – Hypoxia, acid
  - Mechanical receptors in left atrium
- Physiologic factor
  - Systemic demand, increased weight, anemia
  - Usually resp alkalosis



## Bendopnea

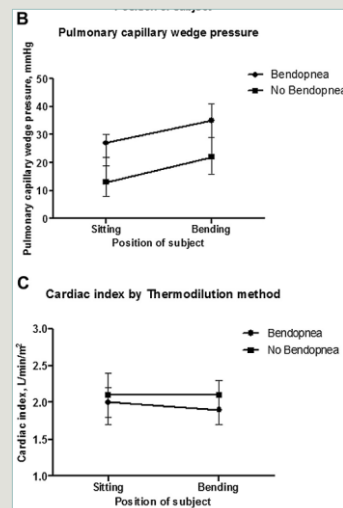
JACC: Heart Failure  
© 2014 by the American College of Cardiology Foundation  
Published by Elsevier Inc.

Vol. 2, No. 1, 2014  
ISSN 2213-1778/14/\$36.00  
<http://dx.doi.org/10.1016/j.jchf.2013.07.009>

### Characterization of a Novel Symptom of Advanced Heart Failure: Bendopnea

Jennifer T. Thibodeau, MD, MSc; Aslan T. Turer, MD, MHS; Sarah K. Gualano, MD; Colby R. Ayers, MS; Mariella Velez-Martinez, MD; Joseph D. Mishkin, MD; Parag C. Patel, MD; Pradeep P. A. Mammen, MD; David W. Markham, MD, MSc; Benjamin D. Levine, MD; Mark H. Drazner, MD, MSc  
Dallas, Texas

- 28% of HFrEF
- Relate with higher RA and PCWP
- Bending
  - Increased RAP and PCWP
  - CI did not change



J Am Coll Cardiol HF 2014;2:24–31.

## Δ NYHA functional class

Table 1. New York Heart Association classification of HF

Class	Description
I	Patient with cardiac disease, but no limitation on ordinary physical activity
II	Comfortable at rest, ordinary activity results in symptoms (slight limitation)
III	Comfortable at rest, less than ordinary activity results in symptoms (marked limitation)
IV	Symptomatic at rest, increased discomfort with any physical activity



NYHA 1928, 1994

## NYHA class

I 度 BNP 軽度 高値	II 度	III 度	IV 度 BNP 高度 高値
<p>心臓病だが、疲れや息切れを感じない</p> <p>ออกกำลังกายได้ ขึ้นสะพานลอยได้</p>	<p>日常生活で、疲れや息切れ、どうきを感じる</p> <p>บันไดเหนื่อย เดินเหนื่อย</p>	<p>少し動いただけで、疲れや息切れ、どうきを感じる</p> <p>อาบน้ำเหนื่อย แต่งตัวเหนื่อย กินข้าวเหนื่อย</p>	<p>静かにしていても、息苦しさをを感じる</p> <p>อยู่เฉยๆ เหนื่อย</p>
ทำงานได้ ไปเที่ยวได้	ออกจากบ้านได้ แต่เหนื่อย	อยู่รอบบ้าน	ติดบ้าน



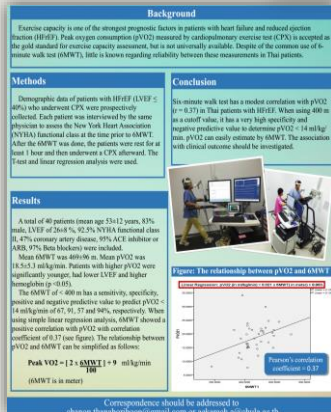
# Student Research

**Reliability of Exercise Capacity Assessment in Thai Patients with Heart Failure with Reduced EF.**  
Comparison between cardiopulmonary exercise test, 6-minute walk test and NYHA Functional Classification.



**Chanon Thanaboriboon<sup>1</sup>, Prach Uthayo<sup>1</sup>, Aekarach Ariyachaipanich, MD<sup>2</sup>**

<sup>1</sup> Faculty of Medicine; <sup>2</sup> Heart Failure and Transplant Cardiology, Division of Cardiovascular Medicine, Department of Medicine; Chulalongkorn University, Bangkok, Thailand



APCHF2016@Korea



## History

Dyspnea

Orthopnea, PND (Bendopnea)

NYHA

Cardiac symptoms

- Chest pain
- Congestion
  - Swollen, ascites
  - Weight gain
- Fatigue
- Palpitation, dizziness
- Syncope
- ICD shock

Look of precipitating factors of acute HF

Life style

- Diet
- Adherence of med
- NSAIDs

Anorexia

- Poor appetite
- Weight loss



**Table 12.1 Factors triggering acute heart failure**

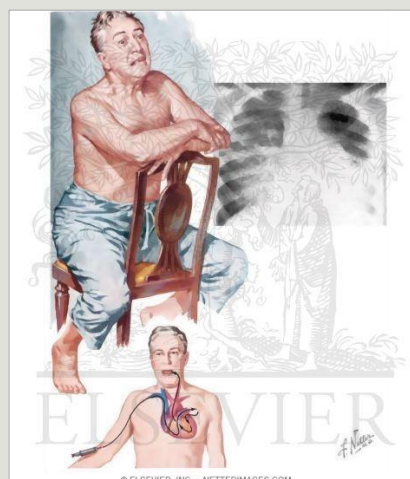
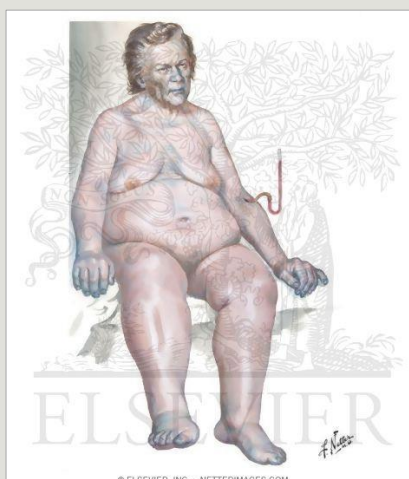
Acute coronary syndrome.
Tachyarrhythmia (e.g. atrial fibrillation, ventricular tachycardia).
Excessive rise in blood pressure.
Infection (e.g. pneumonia, infective endocarditis, sepsis).
Non-adherence with salt/fluid intake or medications.
Bradyarrhythmia.
Toxic substances (alcohol, recreational drugs).
Drugs (e.g. NSAIDs, corticosteroids, negative inotropic substances, cardiotoxic chemotherapeutics).
Exacerbation of chronic obstructive pulmonary disease.
Pulmonary embolism.
Surgery and perioperative complications.
Increased sympathetic drive, stress-related cardiomyopathy.
Metabolic/hormonal derangements (e.g. thyroid dysfunction, diabetic ketosis, adrenal dysfunction, pregnancy and peripartum related abnormalities).
Cerebrovascular insult.
Acute mechanical cause: myocardial rupture complicating ACS (free wall rupture, ventricular septal defect, acute mitral regurgitation), chest trauma or cardiac intervention, acute native or prosthetic valve incompetence secondary to endocarditis, aortic dissection or thrombosis.

precipitating factors

ACS = acute coronary syndromes; NSAIDs = non-steroidal anti-inflammatory drugs.

**Christopherson HEART FAILURE**  
A FUNDAMENTAL COURSE

## Sign



<b>Blood pressure</b>	<b>too low // too high // ↓ pulse pressure</b>
<b>Heart rate</b>	<b>tachycardia</b>
BMI	↑ weight Obesity
Jugular venous pressure	↑ JVP, abnormal hepatojugular reflex
Apex PMI, apical impulse	Lateral shift (cardiomegaly) Diffused (hypertrophy)
Extra heart sounds S3 murmurs	Systolic dysfunction PSM
Pulse	weak, tachy, irregular ? pulsus alternant
Respiratory	Crepitation, wheezing Pleural effusion
Abdomen	Ascites, hepatomegaly
Extremities	Pitting edema 1+, 2+, 3+, 4+ Cool, mottle skin



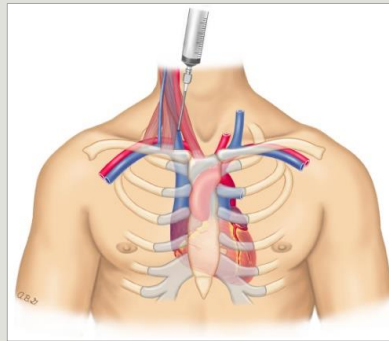
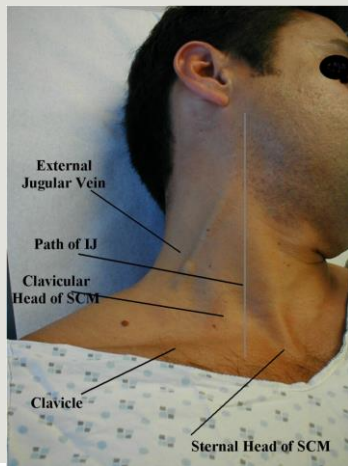
## Jugular venous pressure

- JVP reflects RA pressure
  - Represents RV filling pressure or preload of the RV.

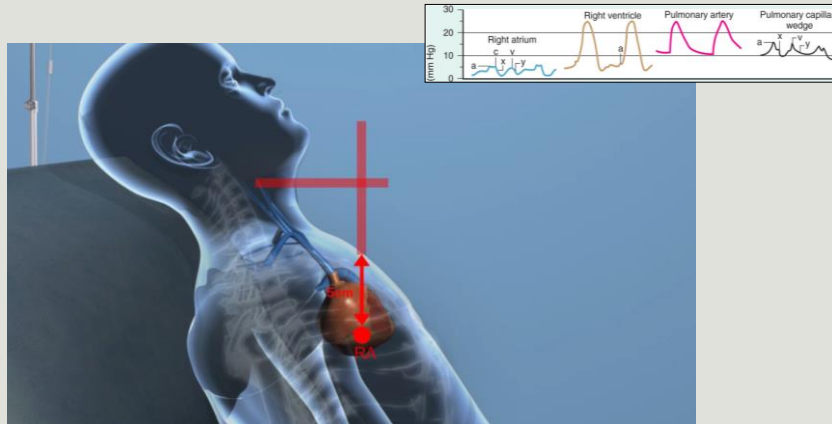
<b>Venous</b>	<b>Arterial</b>
<b>sucking in biphasic, diffuse</b>	<b>pushing out single, sharp</b>
<b>Δ with position, inspiration</b>	<b>no variation</b>
<b>non-palpable</b>	<b>palpable</b>



## position: Internal jugular vein



## Measure vertical distance



- “the JVP is xx cm above sternal angle at \_\_\_ degree”
- “CVP is (xx+5) cm above RA”



## Jugular venous pressure

- PPV of 70-80% to predict RA pressure when  $< 8$  or  $> 12$   
Circ HF 2008;1:170–177
- A prognostic marker for HF death and hospitalization  
NEJM 2001;345:574-81

### Pitfall

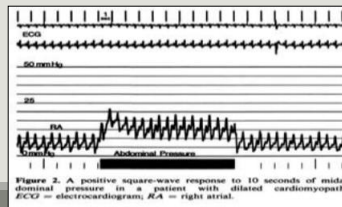
- Not easy
- Inappropriate angle: Too high or too low
- Overestimation
  - giant V wave, cannon A wave, tricuspid stenosis.



## Abdominojugular reflux (Hepatojugular reflux)

- Apply steady pressure → changes in the JVP.
- Normal
  - No change or a transient (few seconds) increase (< 3 cm) in JVP.
- Abnormal
  - Sustained elevation of the JVP
- Associated with elevated PCWP and RA pressure (80%. Se 90% Sp).

*Ann Int Med 1988;109:456*



*Ann Int Med 1988;109:456.*



Acute HF is a  
clinical diagnosis



# Diagnosis

- Clinical
- May consider tests to
  - Confirm Dx
  - Ruling out DDx
  - Help management
- Test
  - CXR, ECG
  - BNP
  - BUN, Cr, electrolyte, CBC, LFT, ABG
  - Echocardiogram



## Exclude other causes of dyspnea if suspected

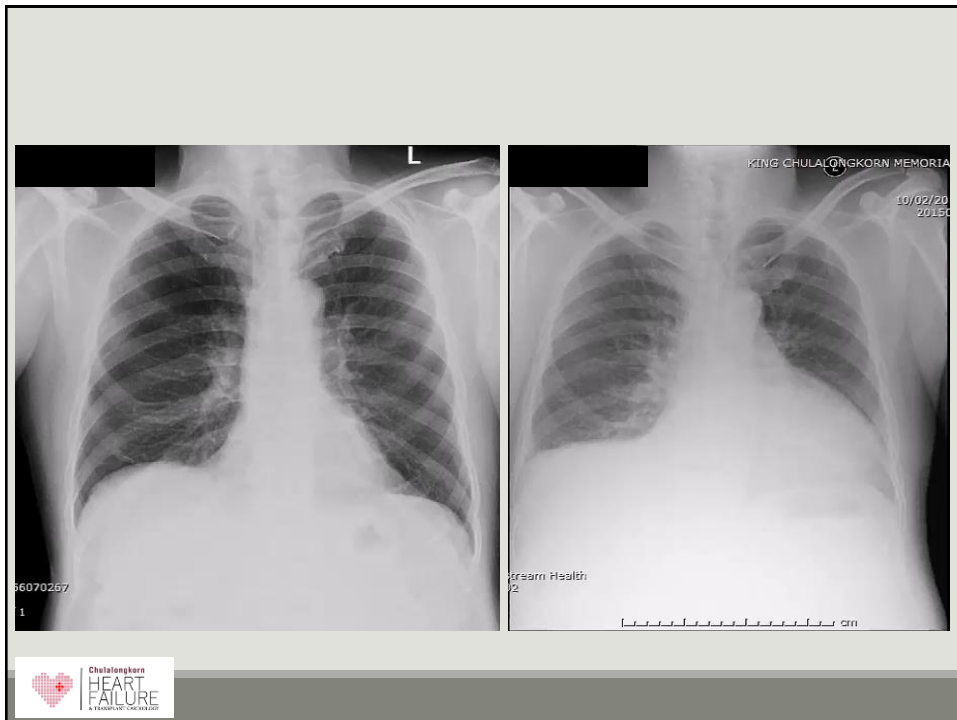
**Immediate phase  
(initial 60–120 minutes)**

### Identification of acute aetiology:

- C** acute **C**oronary syndrome
- H** **H**ypertension emergency
- A** **A**rrhythmia
- M** acute **M**echanical cause<sup>a</sup>
- P** **P**ulmonary embolism



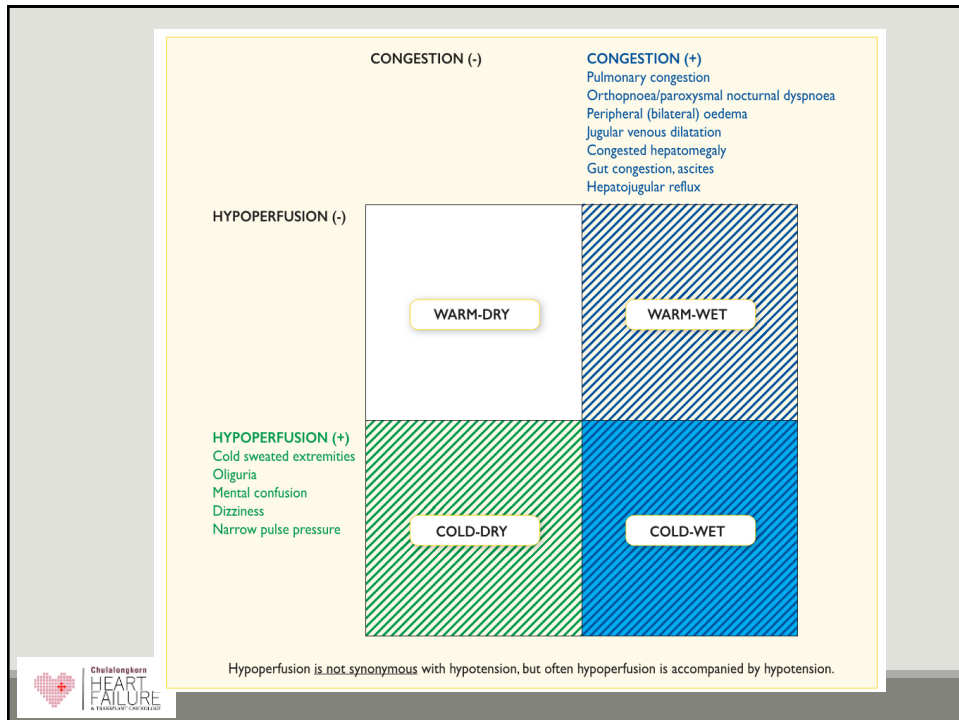
Ponikowski et al. Eur Heart J. 21 May 2016. doi:10.1093/eurheartj/ehw128



## Assessment and plan

ตารางที่ 1 อาการและอาการแสดงของ HF

Congestion ("wet")	Hypoperfusion ("cold")
Orthopnea, PND, weight gain, RUQ discomfort, bloating, satiety	Fatigue, light headedness, exercise intolerance, poor mentation, cachexia
↑ JVP, abnormal hepatojugular reflux, S3, rales, pleural effusion, hepatomegaly, ascites, edema, square wave BP response to valsalva	Narrow pulse pressure, hypotension, pulsus alternans, cool & pale extremities



## Treatment

**Christopherson HEART FAILURE**  
A PARADOXICAL CHALLENGE

## Treatment

- To improve symptoms
- To improve hemodynamics
- To prevent complication
  - ARF, Acute liver injury, DVT
- No treatment have shown to improve survival !!!



## Treatment

### Congestion “WET”

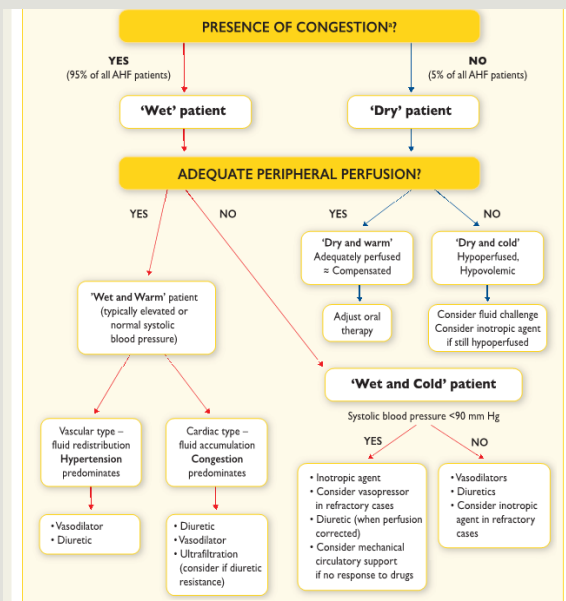
- IV loop diuretics
  - $\geq$  home dose
  - Bolus or iv drip
- Add 2<sup>nd</sup> diuretics
  - HCTZ, spironolactone, tolvaptan
- Dialysis



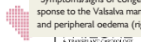
# Treatment

## Poor perfusion "COLD"

- Vasodilator
  - Caution in hypotension
  - NTG, Nitropusside
- Inotrope
  - Risk of arrhythmia, MI
  - Dobutamine, milrinone



**Figure 12.3** Management of patients with acute heart failure based on clinical profile during an early phase  
 \*Symptoms/signs of congestion: orthopnoea, paroxysmal nocturnal dyspnoea, breathlessness, bi-basal rales, an abnormal blood pressure response to the Valsalva maneuver (left-sided); symptoms of gut congestion, jugular venous distension, hepatojugular reflux, hepatomegaly, ascites, and peripheral oedema (right-sided).



# Treatment

## Supporting care

- Na, H<sub>2</sub>O restriction
- Weight monitoring
- Electrolyte monitoring
- DVT prophylaxis



# Treatment

## In severe case (poor)

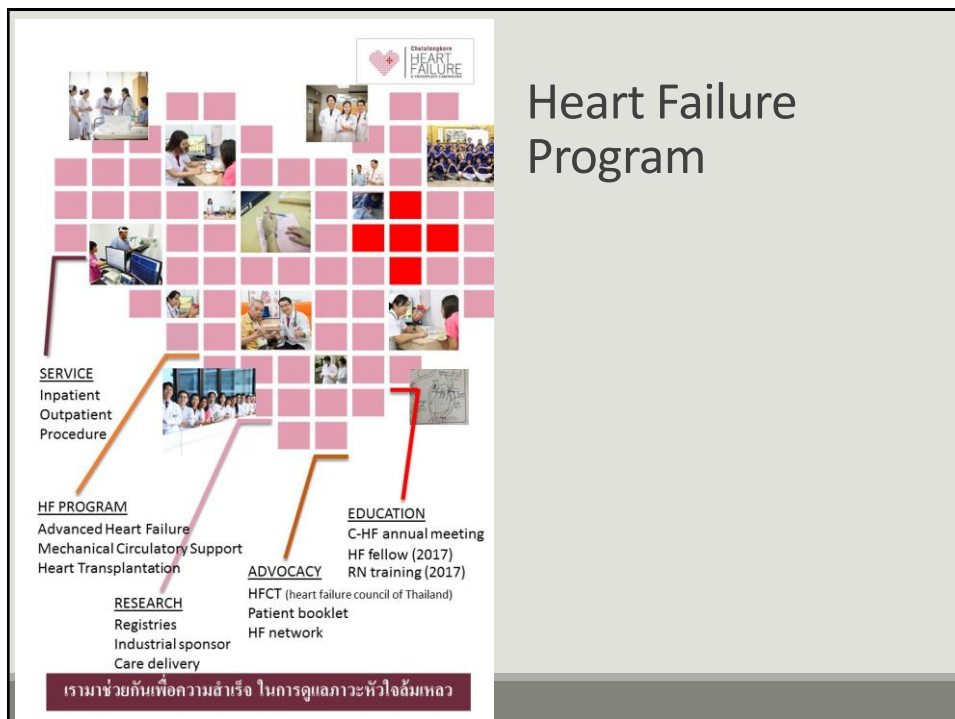
Poor prognosis (BUN > 43, SBP < 115, Cr > 2.7)

- CCU
- Invasive monitor
  - Arterial line, PA catheter (swan cath)
- Intubate/ ventilator
- Mechanical circulatory support (MCS)
  - IABP, LVAD, ECMO
- Heart transplant
- Palliative care

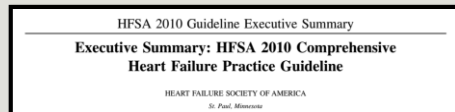
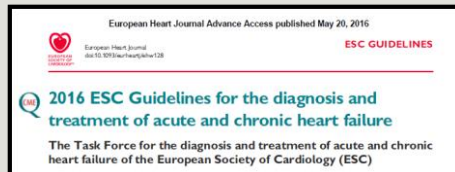
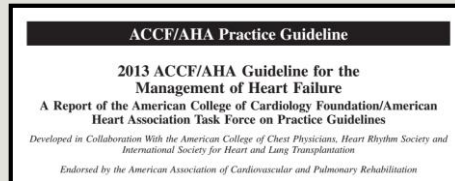
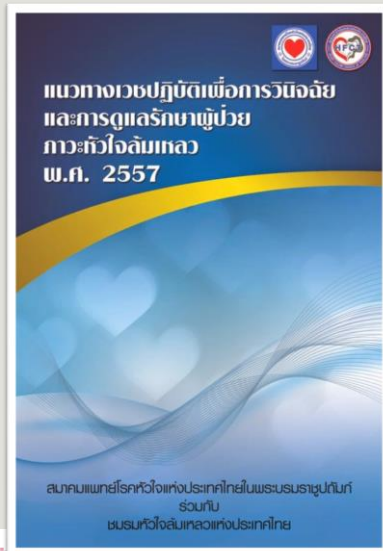


## Prior to discharge

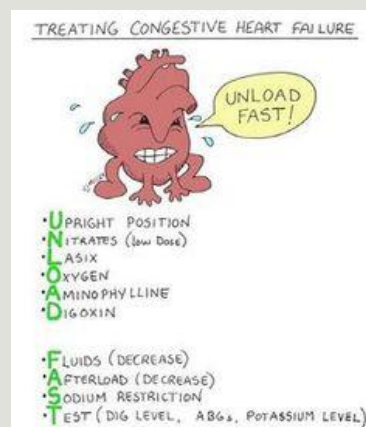
- Identify and treat correctible cause
  - Precipitating factor
    - Cause (etiology of HF) in de novo HF
      - Coronary angiogram?, MRI?
- Shift to chronic HF management
  - Initiate BB, ACEI, MRA if indicate
  - HF education / **HF program**
- Clinic (follow up within 7 days)



## Guideline



Thank you



## ACC/AHA: 2013 HF guideline

**Table 28. Recommendations for Therapies in the Hospitalized HF Patient**

Recommendations	COR	LOE	References
HF patients hospitalized with fluid overload should be treated with intravenous diuretics	I	B	737, 738
HF patients receiving loop diuretic therapy should receive an initial parenteral dose greater than or equal to their chronic oral daily dose; then dose should be serially adjusted	I	B	739
HF/EF patients requiring HF hospitalization on GDMT should continue GDMT except in cases of hemodynamic instability or where contraindicated	I	B	195, 735, 736
Initiation of beta-blocker therapy at a low dose is recommended after optimization of volume status and discontinuation of intravenous agents	I	B	195, 735, 736
Thrombosis/thromboembolism prophylaxis is recommended for patients hospitalized with HF	I	B	21, 770–774
Serum electrolytes, urea nitrogen, and creatinine should be measured during titration of HF medications, including diuretics	I	C	N/A
When diuresis is inadequate, it is reasonable to	IIa	B	38, 739
a. give higher doses of intravenous loop diuretics; or		B	740–743
b. add a second diuretic (eg, thiazide)	IIb	B	744, 745
Low-dose dopamine infusion may be considered with loop diuretics to improve diuresis	IIb	B	752
Ultrafiltration may be considered for patients with obvious volume overload	IIb	C	N/A
Ultrafiltration may be considered for patients with refractory congestion	IIb	A	760–763
Intravenous nitroglycerin, nitroprusside, or nesiritide may be considered an adjunct to diuretic therapy for stable patients with HF	IIb	B	787, 788
In patients hospitalized with volume overload and severe hyponatremia, vasopressin antagonists may be considered			

COR indicates Class of Recommendation; GDMT, guideline-directed medical therapy; HF, heart failure; HF/EF, heart failure with reduced ejection fraction; LOE, Level of Evidence; and N/A, not available.



Yancy CW. ACC/AHA HF guideline. Circ 2013;128:e240-e327

**Table 2 Clinical presentation and initial investigations in Thai ADHERE heart failure patients.**

Presentation and investigation	n = 2041	n (%)
Dyspnea	1973	(96.7)
Dyspnea at rest	1283/1973	(65.0)
NYHA class assessed	1857	(90.7)
NYHA class II	272/1857	(14.7)
NYHA class III	298/1857	(16.2)
NYHA class IV	1283/1857	(69.1)
Fatigue	735	(36.0)
Rales	1726	(84.6)
Peripheral edema	1215	(59.5)

